

EXHIBIT A

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

BARBARA STROUGO, Individually and on Behalf
of All Others Similarly Situated,

Plaintiff(s),

v.

BARCLAYS PLC, BARCLAYS CAPITAL, INC.,
ROBERT DIAMOND, ANTONY JENKINS,
CHRISTOPHER LUCAS, TUSHAR MORZARIA,
and WILLIAM WHITE,

Defendants.

Case No. 14-cv-5797 (SAS)

EXPERT REPORT OF ZACHARY NYE, PH.D.

July 17, 2015

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I. Background and Qualifications

1. I am a financial economist and Vice President at Stanford Consulting Group, Inc. (“SCG”). Since 1981, SCG has provided economic research and expert testimony for business litigation, and regulatory and legislative proceedings. All SCG professionals hold masters or doctoral degrees in business, economics, finance or operations research, and certain senior consultants have testified as experts in these fields. I have an A.B. in Economics from Princeton University; an M.Sc. in Finance from the London Business School; and a Ph.D. in Finance from the Paul Merage School of Business at the University of California, Irvine. I have co-authored academic research published in peer-reviewed conference proceedings, as well as working papers with finance faculty at various universities. My research areas include the market efficiency of underlying and derivative securities, volatility forecasting, risk management, financial econometrics, valuation and corporate finance. I have previously served as an expert witness in matters involving securities litigation, as well as business and intellectual property valuation. My curriculum vitae, which includes my academic research, publications in the past ten years, and prior expert testimony in the past four years, is attached hereto as Exhibit 1.

2. My current hourly rate is \$425. I have received assistance from individuals at SCG, who worked under my direction; their fees charged for this project are their standard hourly rates. Neither my compensation nor that of any individual at SCG is contingent on the outcome of this litigation.

II. Scope of Engagement

3. I have been retained by Counsel for Plaintiffs in this matter to opine as to whether the American Depositary Shares (“ADSs”) of Barclays PLC (“Barclays” or the “Company”), which were listed on the New York Stock Exchange (“NYSE”) under the ticker symbol “BCS,” traded

in an efficient market throughout the period August 2, 2011 through June 25, 2014, inclusive (the “Class Period”). I also have been asked by Counsel to examine the price impact of certain communications alleged in the Complaint to be materially misleading,^{1, 2} and to opine on whether damages for investors who purchased Barclays’ ADSs during the Class Period can be calculated using a method that is common to the class.

III. Bases for Opinions

4. My opinions are based upon my professional knowledge and experience, my review of documents and information relevant to this matter (*see* Exhibit 2), and the analyses described in this report and its exhibits. Documents, data, and other information that I have relied upon as bases for my opinions are cited in this report and its exhibits. Such documents and information are typically relied upon by financial experts in securities class actions and by financial economists in their research.

5. Counsel for Plaintiffs has informed me that the record in this matter continues to be developed. I expect to review additional facts that may become available through discovery as well as the reports and depositions of other expert witnesses. The opinions offered in this report are subject to refinement or revision based on continuing analysis of the documents and information listed above, as well as new or additional information that may be provided to or obtained by me in the course of this matter.

¹ The claims in this action are set forth in the Consolidated Second Amended Complaint for Violations of the Federal Securities Laws, dated May 26, 2015 (the “Complaint”).

² The circuit court decision on appeal in *Halliburton II* defined price impact as follows: “Price impact can be shown either by an increase in price following a fraudulent public statement or a decrease in price following a revelation of the fraud.” (*See Erica P. John Fund, Inc. v. Halliburton Co.*, 718 F.3d 423, 434 (5th Cir. 2013) *vacated and remanded on other grounds*, 134 S. Ct. 2398 (U.S. 2014). This definition was not challenged in the appeal.)

IV. Summary of Opinions

6. Based on my review of the available evidence in this matter and careful analysis of data specific to Barclays relating to the efficiency factors detailed throughout this report, I conclude that the market for Barclays' ADSs was efficient throughout the Class Period. As part of my analysis, I also examined whether the market for Barclays' ordinary shares listed on the London stock exchange ("LSE") traded in an efficient market. Based on my examination of the efficiency factors detailed throughout this report, I conclude that the market for Barclays' London shares also was efficient throughout the Class Period.

7. My event study also demonstrates a statistically significant price impact of news that corrected the alleged misrepresentations described in the Complaint. Specifically, Barclays' shares experienced a statistically significant company-specific price decline on June 26, 2014 in response to the New York Attorney General's announcement (after market close on June 25, 2014) of a lawsuit arising from the operation of Barclays' dark pool. Net of market and industry effects that day, the ADSs declined -7.20% (with a t -statistic of -5.72), while the London shares suffered a decline of -6.33% (with a t -statistic of -5.05).³

8. Additionally, as discussed in §VIII, it is my opinion that damages for investors who purchased Barclays' ADSs during the Class Period can be calculated using a method that is common to the class.

³ If the t -statistic is greater than or equal to 1.97 or less than or equal to -1.97, the difference between the two returns is significantly different from zero at the 5% level of significance. (See note 133.)

V. Overview of Barclays' Operations

9. Founded in 1690, Barclays is a major global financial services provider with operations in over 50 countries across Europe, the Americas, Africa and Asia.⁴ During the Class Period, the Company employed between 132,000 and 140,000 employees,⁵ and through May 8, 2014, was divided into the following business segments:⁶

Business Segment	2011 Income	2012 Income	2013 Income
Retail & Business Banking			
UK Retail & Business Banking	£4,656m	£4,421m	£4,523m
Europe Retail & Business Banking	£1,226m	£915m	£666m
Africa Retail & Business Banking	£3,767m	£3,157m	£2,617m
Barclaycard	£4,095m	£4,170m	£4,786m
Corporate and Investment Banking			
Barclays Capital / Investment Bank	£10,335m	£11,722m	£10,733m
Corporate Banking	£2,912m	£2,918m	£3,115m
Wealth & Investment Management	£1,797m ⁷	£1,815m	£1,839m

10. The Company describes each of these business segments as follows:⁸

UK Retail and Business Banking (UKRBB): A leading UK high street bank providing retail banking services and general insurance to individuals and business banking services to small and medium enterprises (SMEs)

Europe Retail and Business Banking (Europe RBB): A local presence for Barclays customers in Spain, Italy, Portugal and France, providing retail banking services to mass-affluent individuals and business banking services to SMEs

Africa Retail and Business Banking (Africa RBB): A leading pan-African retail and business bank serving customers and clients in 12 countries with a range of banking and bancassurance solutions

⁴ Barclays' Annual Report for 2014, p. 5.

⁵ Barclays' Annual Reports for 2011 (p. 5), 2012 (p. 6), 2013 (p. 2), 2014 (p. 71).

⁶ Barclays' Annual Reports for 2011 (p. 3), 2012 (p. 3), 2013 (p. 3).

⁷ In the 2011 Annual Report, Barclays Wealth and Barclays Investment Management are reported as separate business segments with income of £1,744m and £53m, respectively.

⁸ Barclays' Annual Report for 2012, p. 3.

Barclaycard: A leading international payments business, offering payments and lending to individuals, and a range of business services including card issuing and payment acceptance services

Investment Bank: A global investment bank serving large corporate clients, financial institutions, governments and institutional investors with financial advisory, capital-raising, financing and risk management services

Corporate Banking: A leading provider of integrated cash management, financing and risk management solutions to large corporate clients in the UK and South Africa, and multinationals and financial institutions globally

Wealth and Investment Management: A premier global wealth manager and advisor, providing private and intermediary clients with international and private banking, investment management, fiduciary services and brokerage

11. As of May 8, 2014, the Company's business structure was repositioned such that there were four "Core" businesses: (i) Personal and Corporate Banking; (ii) Africa Banking; (iii) Barclaycard; and (iv) Investment Banking, "operating only in areas where we have capability, scale and competitive advantage".⁹ The Company also created "Non-Core," unit which "groups together assets that are not strategically attractive" to the Company, which it intended to "exit or run down" over time.

VI. The Markets for Barclays' ADSs and London Shares Were Efficient Throughout the Class Period

12. During the Class Period, Barclays' ordinary shares primarily traded on the London Stock Exchange ("LSE") under the symbol "BARC." In the U.S., Barclays' stock was listed on the NYSE, under the symbol "BCS," and traded in the form of American Depositary Shares (ADSs), each of which represented four ordinary shares (*i.e.*, four BARC shares). During the Class Period, Barclays' ADSs represented approximately 3%–4% of the total ordinary shares

⁹ Barclays' Annual Report for 2014, p. 10.

outstanding.¹⁰ At the start of the Class Period, the Company's market capitalization exceeded \$42 billion. By the end of the Class Period, the Barclays' market capitalization exceeded \$64 billion, putting it in the top 6% of stocks that traded on the NYSE, and in the top 1% of stocks that traded on the LSE in terms of size throughout the Class Period.¹¹

13. The NYSE is the largest secondary trading market in the world, listing common stock, preferred stock and warrants, as well as certain debt and corporate structured products.¹² At the start of the Class Period, there were 2,467 issuers and 3,969 issues listed on the NYSE¹³ with a total market capitalization of \$13.9 trillion.¹⁴ The NYSE is a "national securities exchange" registered with the SEC under Section 6 of Exchange Act,¹⁵ and companies listed on the NYSE "meet and adhere to the overall highest listing standards in the world."¹⁶

14. A security's listing on a national securities exchange means that financial information about that company is readily available to investors, at a minimum, through the company's SEC filings, and that investors have access to trading prices and volumes throughout the trading day.¹⁷

¹⁰ At year-end 2011, 2012, and 2013, there were approximately 12.2 billion, 12.2 billion, and 16.1 billion ordinary shares outstanding, and approximately, 96.9 million, 122.5 million, and 113.5 million ADSs outstanding. (See Exhibit 3.)

¹¹ See Exhibit 4.

¹² NYSE Form 10-K for 2011, filed February 29, 2012, p. 9.

¹³ <http://www.nyxdata.com/Data-Products/Facts-and-Figures> (Choose: Listed Companies > NYSE Euronext - Monthly Number of Issues and Issuers > 2010 – current)

¹⁴ <http://www.nyxdata.com/Data-Products/Facts-and-Figures> (Choose: NYSE Historical Statistics > Market Capitalization of NYSE Companies)

¹⁵ <http://www.sec.gov/divisions/marketreg/mrexchanges.shtml>.

¹⁶ <https://www.nyse.com/products/equities>.

¹⁷ The Consolidated Tape Association (CTA) oversees the dissemination of real-time trade and quote information in New York Stock Exchange LLC (Network A) and BATS, NYSE Arca, NYSE MKT and other regional exchange (Network B) listed securities. Since the late 1970s, all

Rules of the U.S. National Market System (“NMS”) also require that investor orders in NYSE-listed securities be filled at the best price that can be executed immediately, even if that price is available in a different market.¹⁸ Because listing on a national securities exchange brings together many thousands (or millions) of investors, trading prices reflect a consensus opinion as to a security’s value.

15. At least one authority has commented that:

at a minimum, there should be a presumption—probably conditional for class determination—that certain markets are developed and efficient for virtually all the securities traded there: the New York and American Stock Exchanges, the Chicago Board Options Exchange and the NASDAQ National Market System.¹⁹

In the *Cammer* decision, the Court stated:

... some may concur with [Defendant’s] suggestion ... that companies listed on national stock exchanges or companies entitled to issue new securities using SEC Form S-3 would almost by definition involve stock trading in an ‘open and developed’ market.²⁰

16. Barclays’ London shares (BARC) were listed on LSE’s principal market known as the “Main Market,”²¹ which is intended for “larger, more established companies.”²² The LSE is a

SEC-registered exchanges and market centers that trade Network A or Network B securities send their trades and quotes to a central consolidator where the Consolidated Tape System (CTS) and Consolidated Quote System (CQS) data streams are produced and distributed worldwide. (Source: <https://cta.nyxdata.com/CTA>.)

¹⁸ Bodie, Zvi, Alex Kane and Alan J. Marcus, *Investments*, McGraw-Hill/Irwin, 2008, 7th Ed., Ch. 3, pp. 73, 74.

¹⁹ Bromberg & Lowenfels, 4 Securities Fraud and Commodities Fraud, Section 8.6 (Aug. 1988) (quoted in *Cammer*, 711 F. Supp at 1292).

²⁰ *Cammer*, 711 F. Supp. at 1276–7.

²¹ <http://www.londonstockexchange.com/statistics/historic/company-files/company-files.htm>

²² The LSE offers three markets:

(1) the Main Market “offers the highest level of protection to investors and gives companies access to the deepest capital pool”;

major international stock exchange. During the Class Period, the number of companies listed on the LSE was over 2700,²³ with a combined domestic market capitalization ranging from \$3.3 trillion to \$4.4 trillion.²⁴ Indeed, the LSE was the world's 4th largest stock exchange by domestic market capitalization throughout the Class Period. The LSE touts the efficiency of its trading platforms:

Those investing in or quoted on the Exchange's markets benefit from next generation trading systems and the highest standards of corporate governance. As well as giving participants greater confidence, these improve market efficiency and drive down costs.²⁵ ...

The speed and efficiency of our trading systems also aids liquidity as it enables and encourages greater levels of trading activity in securities. In turn, this attracts and retains further investment capital. We invest heavily in our technology to ensure that our trading platforms remain robust and efficient.²⁶

17. Companies listed on a United Kingdom stock exchange, including the LSE, are regulated by the UK Listing Authority (UKLA). At the start of the Class Period, the UKLA was part of the Financial Services Authority (FSA), the body responsible for: banking supervision from the

(2) the AIM “for smaller, growing companies wishing to raise equity capital at an earlier stage of development”; and

(3) the Professional Securities Market (PSM) designed for Companies seeking to raise debt capital purely from professional investors.

LSE's Main Market is its principal market, intended for “larger, more established companies.” (LSE Guide to Capital Markets, pp. 12, 13.)

²³ World Federation of Exchanges Annual Query Tool (<http://www.world-exchanges.org/statistics/annual-query-tool> Indicator = Number of Listed Companies)

²⁴ World Federation of Exchanges Annual Query Tool (<http://www.world-exchanges.org/statistics/annual-query-tool> Indicator = Domestic Market Capitalization)

²⁵ LSE Guide to Capital Markets, p. 3 (available at <http://www.londonstockexchange.com/companies-and-advisors/listing/markets/guide-to-capital-markets.pdf>)

²⁶ LSE Guide to Capital Markets, p. 9.

Bank of England; listing authority from the London Stock Exchange; investment services regulation; and mortgage and general insurance business regulation authority to take action to prevent market abuse.²⁷ Effective April 2013, as part of the Financial Services Act of 2012, the FSA was replaced by two agencies, the Financial Conduct Authority and the Prudential Regulation Authority (PRA).²⁸

i. Comparison of Trading Venues for Barclays' ADSs and Ordinary Shares

18. As is the case with all NYSE-listed equities, Barclays' ADSs traded on numerous national securities markets and Alternative Trading Systems ("ATs") during the Class Period. As mentioned above, SEC Regulation NMS requires all trading centers in the U.S. "to establish, maintain, and enforce written policies and procedures reasonably designed to prevent the execution of trades at prices inferior to protected quotations displayed by other trading centers."²⁹ According to the SEC:

The NMS is premised on promoting fair competition among individual markets, while at the same time assuring that all of these markets are linked together, through facilities and rules, in a unified system that promotes interaction among the orders of buyers and sellers in a particular NMS stock. The NMS thereby incorporates two distinct types of competition – competition among individual

²⁷ <https://www.fca.org.uk/about/history>

²⁸ According to the FSA website, the Financial Services Act of 2012 set out a new system for regulating financial services in order to protect and improve the UK's economy. The purpose of the FSA is to:

- maintain and ensure the integrity of the market
- regulate financial services firms so that they give consumers a fair deal
- ensure the financial services market is competitive

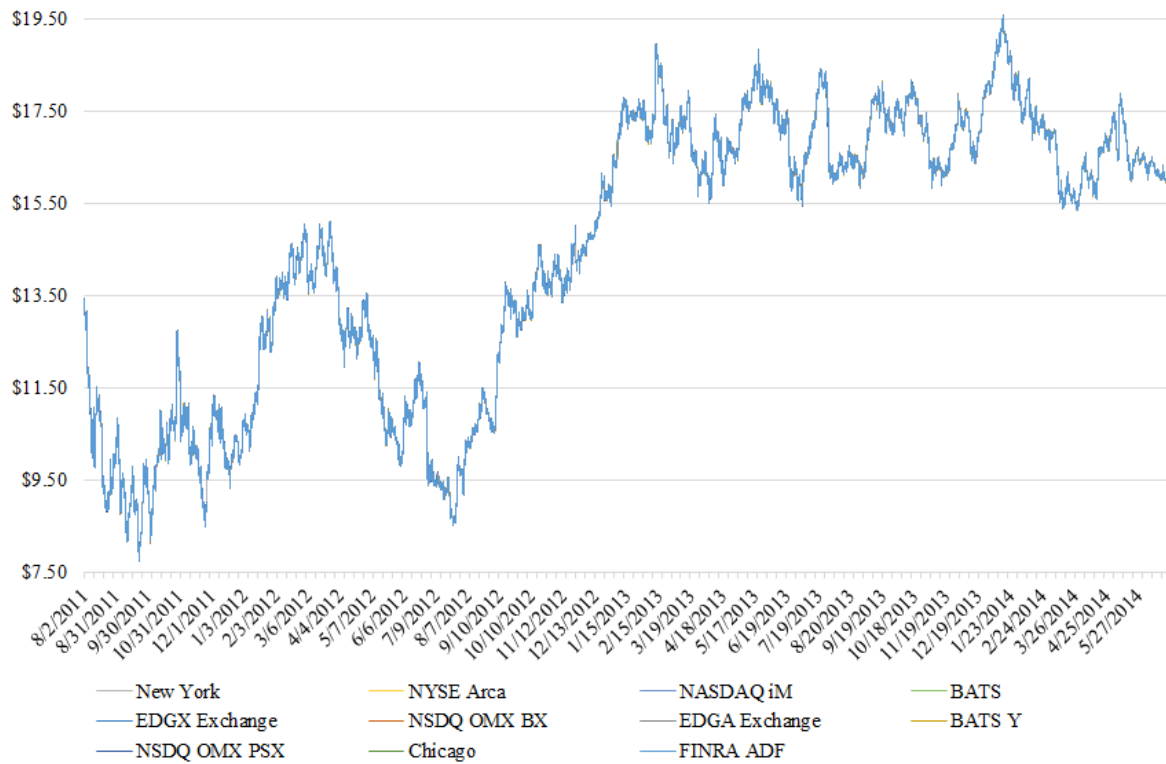
The PRA "is responsible for the prudential supervision and regulation of banks, building societies, credit unions, insurers and investment firms." (*Id.*)

²⁹ SEC Regulation NMS, Securities Exchange Act Release No. 51808 (Jun. 9, 2005), 70 FR 37496 (Jun. 29, 2005) at 37496.

markets and competition among individual orders – that together contribute to efficient markets. Vigorous competition among markets promotes more efficient and innovative trading services, while integrated competition among orders promotes more efficient pricing of individual stocks for all types of orders, large and small. Together, they produce markets that offer the greatest benefits for investors and listed companies.³⁰

19. The degree of market and order competition, and in turn relative price efficiency, for NMS securities, such as Barclays' ADSs, is easily observed by examining the contemporaneous transaction prices that occur on all U.S. trading centers. In highly competitive and efficient markets, one would expect to see investors able to trade at virtually identical prices at a given point in time, regardless of where the trade occurs. With respect to Barclays' ADSs, this was precisely the case during the Class Period. As shown in Exhibit 5A, the average price difference between the NYSE and all other U.S. trading centers at the end of every *five-minute interval* during Class Period was \$0.000, the median difference was \$0.000 and 99.997% of all five-minute price differentials were less than \$0.10. The following chart, in which the intraday prices across the 11 U.S. trading centers are so close that only a single price series can be distinguished, further demonstrates how closely Barclays' ADS traded in terms of price across the various U.S. trading centers at each five-minute interval during the Class Period.

³⁰ *Id.*, at 37498–9.

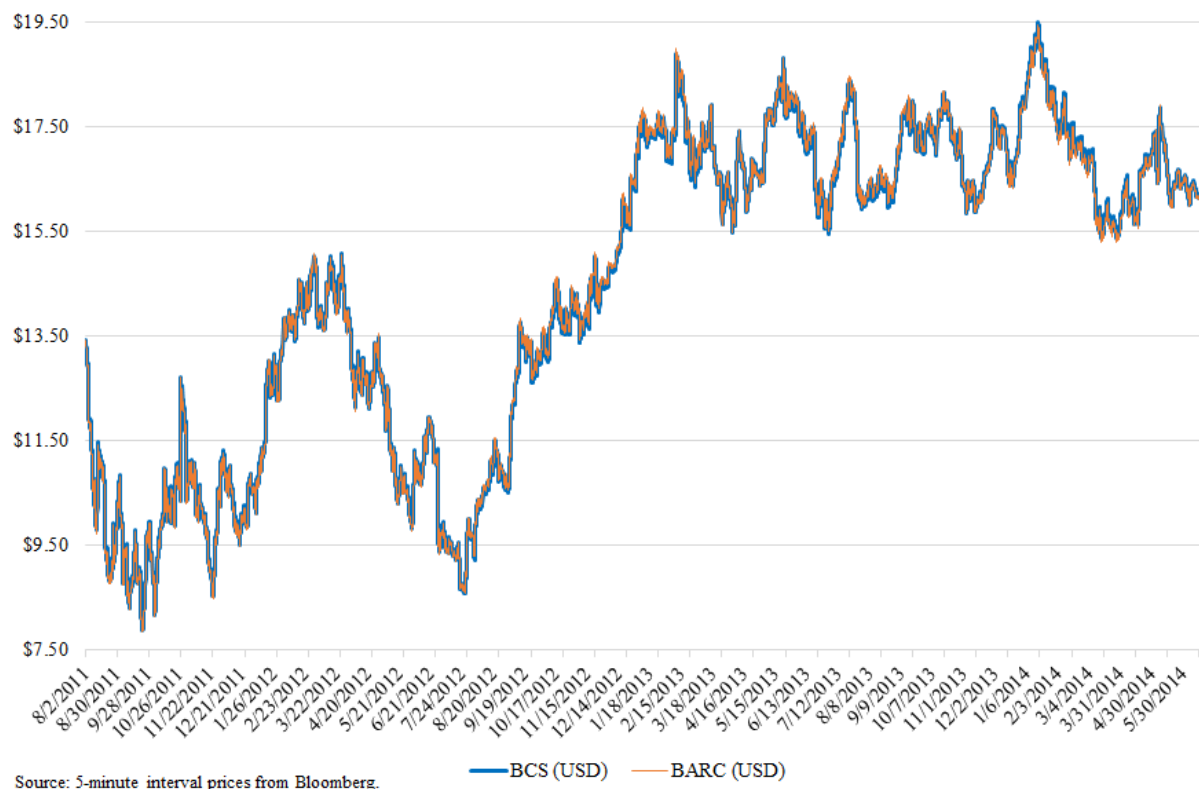
Intraday Prices of BCS Shares Traded on Each U.S. Trading Center

Source: 5-minute interval prices from Bloomberg.

20. However, while Regulation NMS may play a part in facilitating the high degree of relative price efficiency observed across U.S. trading centers, no such regulation governs the relationship between U.S. and non-U.S. markets. For intraday price parity to be achieved in both U.S. and non-U.S. markets (after converting to U.S. dollars), only the work of informed investors and arbitrageurs seeking to profit from intraday price discrepancies (*i.e.*, the fundamental facilitators of market efficiency) can be the cause. As shown in Exhibit 5B, during trading hours when the NYSE and LSE were simultaneously open (*i.e.*, 9:30AM Eastern to 11:35AM Eastern), the average five-minute price difference between Barclays' ADSs and BARC shares (traded in London) was \$0.005, the median difference was \$0.000, and 98.161% of all five-minute price

differentials were less than \$0.10.³¹ Indeed, as shown in the following chart, Barclays' ADS price traded in lockstep with its London shares in terms of price throughout the Class Period.³²

Intraday Prices of Barclays' U.S. and London Shares
(in U.S. Dollars)



21. As is evident from the intraday prices observed across all U.S. trading centers and on the LSE, these markets were efficient enough to ensure price parity throughout each day. However, while these results do not sufficiently demonstrate that the price of Barclays' ADSs and London

³¹ For the purposes of comparison with the ADSs, BARC prices have been converted to USD and multiplied by a factor of four.

³² Further demonstrating the relative efficiency of Barclays' ADSs and London shares, Exhibit 5C shows: 1) that the daily returns of the ADSs and London shares exhibited a 99.9% correlation with each other, when calculated using contemporaneous market prices (*e.g.*, when both markets were open at 9:30AM Eastern); and 2) there is no statistical evidence of cross autocorrelation between the ADSs and London shares (*i.e.*, daily BCS returns could not have been predicted using lagged daily BARC returns).

shares were informationally efficient (*i.e.*, reflected all public information) since investors may only have been savvy enough to eliminate obvious arbitrage opportunities caused by inter-market price discrepancies, they do imply that the various trading centers for Barclays' ADSs and London shares were equally efficient, to whatever degree, during the Class Period. Thus, a demonstration of informational efficiency for the market for the Barclays' ADSs directly implies the informational efficiency of the Barclays' London shares and vice versa.

22. My analyses of the *Cammer* factors and other market efficiency factors set forth below confirm the attributes of market efficiency that the listing of Barclays' stock on the NYSE and LSE strongly implies.

ii. Application of the *Cammer* Factors Demonstrates That the Market for Barclays' ADSs were Efficient during the Class Period

23. In this case, Plaintiffs have asserted the "fraud on the market" theory of reliance for certain of their claims. The "fraud on the market" theory was first addressed by the U.S.

Supreme Court in *Basic, Inc. v. Levinson*:

In an open and developed securities market, the price of a company's stock is determined by the available material information regarding the company and its business.... Misleading statements will therefore defraud purchasers of stock even if the purchasers do not directly rely on the misstatements.... The causal connection between the defendants' fraud and the plaintiffs' purchase of stock in such a case is no less significant than in a case of direct reliance on misrepresentations.³³

24. Since *Basic*, academic economists have debated various forms of the efficient capital market hypothesis ("ECMH").³⁴ Recently, the Supreme Court clarified that *Basic* did not

³³ *Basic, Inc. v. Levinson*, 485 U.S. 224, 240 (1988).

³⁴ Generally speaking, academic economists consider there to be three forms of market efficiency: "weak" form, "semi-strong" form, and "strong" form market efficiency. (See Elton, E., M. Gruber, S. Brown and W. Goetzmann, *Modern Portfolio Theory and Investment Analysis*,

“endorse ‘any particular theory of how quickly and completely publicly available information is reflected in market price.’”³⁵ To the contrary, the “fraud-on-the-market” theory is based “on the fairly modest premise that ‘market professionals generally consider most publicly announced material statements about companies, thereby affecting stock market prices.’”³⁶ Under this theory, investors’ reliance on any public material misrepresentations and/or omissions may be presumed for purposes of a Rule 10b-5 action since the effects of those misrepresentations and/or omissions will already be impounded in the market price.³⁷

25. While the Supreme Court in *Halliburton II* stated that a market need only be “generally efficient” to invoke the “fraud-on-the-market” presumption, it did not adopt any particular test of general market efficiency.³⁸ Accordingly, I consider in this report direct and indirect tests of efficiency that have been commonly used in securities litigation. A direct empirical test of

Sixth Edition, John Wiley and Sons, Inc., 2007, p. 400.) In fraud-on-the-market litigation, several courts reference the semi-strong form of efficiency, which implies that market prices incorporate all publicly available information. In academic finance literature, this is referred to as “informational efficiency.” This hypothesis has been empirically validated in numerous studies. (See, e.g., Fama, Eugene F., 1970 “Efficient Capital Markets: A Review of Theory and Empirical Work,” *Journal of Finance*, Vol. 25, Issue 2, pp. 383–417.) The ECMH also has stood up against its critics; while anomalies have occurred in financial markets, they appear to be random and do not allow for trading strategies that would create abnormal profits. (See, e.g., Fama, Eugene F., 1998, “Market Efficiency, Long-term Returns, and Behavioral Finance,” *Journal of Financial Economics*, Vol. 49, pp. 283–306; and Malkiel, Burton G., 2003, “The Efficient Market Hypothesis and Its Critics,” *Journal of Economic Perspectives*, Vol. 17, pp. 59–82.)

³⁵ *Halliburton Co. v. Erica P. John Fund, Inc.*, -- U.S. --, 134 S. Ct. 2398, 2403 (June 23, 2014) (“*Halliburton II*”), quoting *Basic*.

³⁶ *Id.*, quoting *Basic*.

³⁷ *Basic, Inc. v. Levinson*, 485 U.S. 224, 241–242, 244 (1988), quoting *Peil v. Speiser*, 806 F.2d 1154, 1160–61 (3d Cir. 1986); see also, *Erica P. John Fund, Inc. v. Halliburton Co.*, No. 09-1403, 563 U.S. 7 (2011) (June 6, 2011).

³⁸ *Halliburton II*, 134 S. Ct. at 2404.

market efficiency is to examine price responsiveness to the release of new and material information about the company in question. If the security price responds quickly, the response supports a conclusion that the market for the security is efficient. As an indirect test of efficiency, one can examine whether market conditions promote efficiency.

26. Consistent with *Basic* and *Halliburton II*, Judge Lechner's oft-cited decision in *Cammer v. Bloom* considered "efficient markets" to be "markets which are so active and followed that material information disclosed by a company is expected to be reflected in the stock price."³⁹ *Cammer* identified five non-exhaustive factors that may be considered in determining whether the market for a security is efficient and, therefore, whether security prices respond quickly to new relevant information. These factors include both a direct empirical test, as well as indirect indicators, of market efficiency. These five factors have been widely adopted by courts throughout the country in evaluating market efficiency in "fraud on the market" cases.⁴⁰ In forming my opinion, I have considered each of the five *Cammer* Factors as applied to Barclays' ADSs and London shares, separately:⁴¹

A. whether the security trades at a large weekly volume;

³⁹ *Cammer v. Bloom*, 711 F. Supp. 1264, 1276 n.11 (D.N.J. 1989)

⁴⁰ *Unger v. Amedisys Inc.*, 401 F.3d 316, 323 (5th Cir. 2005); *Bell v. Ascendant Solutions, Inc.*, 422 F.3d 307, 313 n.10 (5th Cir. 2005); *In re DVI, Inc. Sec. Litig.*, 249 F.R.D. 196, 214-217 (E.D. Pa. 2008), *aff'd* 659 F.2d 623 (3d Cir. 2011) (finding market efficiency by considering whether DVI's securities (1) were traded on a public exchange; (2) had large trading volumes; (3) were followed by market analysts; (4) had several market makers; (5) could be and were registered on SEC Form S-3; and (6) responded quickly to the release of company-specific information, as well as by considering (7) the size of market capitalization of the issuer; (8) the size of the public float for the security; (9) the ability to short sell the security; and (10) the level of autocorrelation).

⁴¹ *Cammer*, 711 F. Supp. 1264 at 1285-87.

- B. whether analysts follow and report on the security;
- C. whether the security has market makers and whether there is a potential for arbitrage activity;
- D. whether the company is eligible to file SEC Form S-3; and
- E. whether there are empirical facts showing a cause-and-effect relationship between unexpected corporate events or financial information releases, and an immediate response in the security's price.

27. In addition to these five *Cammer* Factors, I have considered three other factors which have also been considered by courts in evaluating market efficiency.⁴² These additional factors are:

- F. the company's market capitalization;
- G. the security's public float; and
- H. the degree of autocorrelation present in the security's returns.

28. An analysis of these factors for Barclays' ADSs and London shares supports my conclusion that the market for each of these securities was informationally efficient throughout the Class Period.

A. *Cammer* Factor 1: Weekly Trading Volume

29. According to the *Cammer* decision:

... the existence of an actively traded market, as evidenced by a large weekly volume of stock trades, suggests there is an efficient market ... because it implies significant investor interest in the company. Such interest, in turn, implies a likelihood that many investors are executing trades on the basis of newly available or disseminated corporate information.⁴³

⁴² *In re DVI, Inc. Sec. Litig.*, 249 F.R.D. 196, 214-217 (E.D. Pa 2008), *aff'd* 659 F.2d 623 (3d Cir. 2011); *Krogman v. Sterritt*, 202 F.R.D. 467, 478 (N.D. Tex. 2001).

⁴³ *Cammer*, 711 F. Supp. at 1286.

30. A market for a security is liquid if investors can trade a large number of shares on demand. Liquidity allows investors to buy and sell shares quickly when their assessments about the value of a company has changed, facilitating the prompt price reaction to material new information that is characteristic of an efficient market. The large weekly trading volume of Barclays' ADSs and London shares during the Class Period indicates the presence of a liquid market.

31. Under *Cammer*, "turnover measured by average weekly trading of 2% or more of the outstanding shares would justify a strong presumption that the market for the security is an efficient one; 1% would justify a substantial presumption."⁴⁴ During the Class Period, the number of Barclays ADSs issued and outstanding ranged from approximately 87 million to 133 million shares. The total number of ordinary shares issued and outstanding ranged from approximately 12.2 billion to 16.4 billion shares. The average weekly reported trading volume for the shares, excluding weeks not entirely contained within the Class Period, was as follows:⁴⁵

	Barclays ADS	Barclays London Shares (BARC)
Average Weekly Trading Volume in Dollars/Pounds	\$268,223,278	£1,672,727,820
Average Weekly Trading Volume in Shares	18,653,052	693,190,780
Average Weekly Share Trading Volume as a % of Shares Outstanding	17.7%	5.2%

⁴⁴ *Cammer*, 711 F. Supp. at 1293, quoting *Bromberg*.

⁴⁵ See Exhibit 3 for a summary of weekly trading volume and shares outstanding.

Thus, whether one considers trading on U.S. exchanges, or non-U.S. exchanges, the average weekly reported trading volume for Barclays' stock exceeds the 2% "strong presumption" of market efficiency set out by *Cammer*.

32. I also have examined the annualized turnover ratios for Barclays' ADSs and London shares.⁴⁶ Based on 133.4 million ADSs outstanding at the end of the Class Period, and a total of 16.4 billion ordinary shares outstanding at the end of the Class Period, the total trading volume on U.S. and non-U.S. exchanges during the Class Period implies the following annualized turnover ratios:⁴⁷

	Barclays ADSs	Barclays London Shares (BARC)
Total Shares Traded in Class Period	2,801,907,976	106,628,528,675
Annualized Share Turnover	725.15%	224.25%

33. By comparison, the average annualized turnover ratio for all stocks listed on the NYSE in 2011, 2012, 2013, and 2014 was: 86%, 67%, 58%, and 57%, respectively.⁴⁸ Thus, the annualized turnover ratio for Barclays' ADSs was more than 8 times greater than the average for all stocks listed on the NYSE during the Class Period. The annualized turnover ratio for Barclays' London shares was more than 2 times greater than the average for all stocks listed on the NYSE during the Class Period.

34. The high trading volumes and high annualized turnover ratios observed during the Class Period support a conclusion that both Barclays' ADSs and London shares traded in an efficient market during that time.

⁴⁶ Annualized turnover ratio is trading volume divided by the number of shares outstanding divided by time period in years.

⁴⁷ See Exhibit 3.

⁴⁸ NYSE Factbook Online, <http://www.nyxdata.com/nyxdata/default.aspx?tabid=115>; choose "Market Activity" then "NYSE Group Turnover."

B. *Cammer* Factor 2: Number of Securities Analysts

35. In demonstrating market efficiency, the *Cammer* decision states:

... it would be persuasive to allege a significant number of securities analysts followed and reported on a company's stock during the class period. The existence of such analysts would imply, for example, the [auditor's] reports were closely reviewed by investment professionals, who would in turn make buy/sell recommendations to client investors.[] In this way the market price of the stock would be bid up or down to reflect the financial information contained in the [auditor's] reports, as interpreted by the securities analysts.⁴⁹

36. Securities analysts research and report to investors on the financial condition and prospects of a covered company. Analysts are conduits to the market for information collected from management from on-site visits, conference calls accompanying key company announcements, and other contacts with senior management. Analysts can channel new information to the market rapidly through their published reports, online reporting services (*e.g.*, First Call), and alerts given to clients and other employees of the same investment firm. Analysts thus facilitate the dissemination of new information to investors and any corresponding share price reaction.

37. During the Class Period, several well-known investment firms followed and published research reports on Barclays, including: BofA Merrill Lynch (19 reports); Canaccord Genuity (20 reports); Citigroup (110 reports); Deutsche Bank Equity Research (78 reports); Evolution Securities (6 reports); Jefferies (10 reports); JPMorgan (61 reports); Morgan Stanley (31 reports); Numis Securities (25 reports); RBC Capital Markets (27 reports); Royal Bank of Scotland (17

⁴⁹ *Cammer*, 711 F. Supp. at 1286.

Reports); and UBS Equities (55 reports) (see Exhibit 6A). A total of over 700 analyst reports for Barclays were issued during the Class Period.⁵⁰

38. Financial information pertinent to Barclays was further disseminated to investors via media coverage, investor conferences, trade magazines, Company presentations and SEC filings during the Class Period. Specifically, articles concerning Barclays appeared in major U.S. and international news media, including: *Associated Press Newswires*; *Business Line (The Hindu)*; *Business Wire*; *The Daily Mail*; *The Daily Mirror*; *Dow Jones International News*; *Dow Jones News Service*; *ENP Newswire*; *Financial News*; *Global Banking News*; *The Guardian*; *Hedge Week*; *The Hindu*; *Hindustan Times*; *The Independent*; *London Evening Standard*; *Los Angeles Times*; *The Mail on Sunday*; *Market News Publishing*; *Markets Media*; *MarketWatch*; *The New York Times*; *Newsweek*; *PR Newswire*; *Regulatory News Service*; *Reuters News*; *Reuters Significant Developments*; *StreetInsider.com*; *The Sun*; *The Sunday Mirror*; *The Sunday Telegraph*; *The Sunday Times*; *Theflyonthewall.com*; *The Times*; *The Times of India*; *Traders Magazine*; *USA Today*; *The Wall Street Journal (U.S., Europe, and online)*; and *The Washington Post*.⁵¹

⁵⁰ Exhibit 6B lists over 700 research reports on Barclays available from Thomson Reuters Knowledge with Barclays PLC as the primary ticker. These reports may be only a subset of all reports pertaining to Barclays published during the Class Period. Other restricted databases (*e.g.*, First Call) may carry research reports pertaining to Barclays that are not included in the Thomson Reuters Knowledge database. Furthermore, it is my understanding that certain analyst firms do not make all their reports available through historical and/or public databases.

⁵¹ Results were obtained from Dow Jones' Factiva (www.factiva.com, using "Search Builder," where "Company" = "Barclays PLC," excluding duplicate articles).

39. In addition, Barclays' filings with the SEC were publicly available online during the Class Period at no cost.⁵² Barclays' SEC filings during the Class Period included its audited consolidated quarterly and year-end financial statements and Company press releases.⁵³ Filings with the SEC were made on Form 6-K, which is a form used by foreign companies that have issued securities in the U.S. Any information that a foreign company issues to its local securities regulators, investors or stock exchange must also be submitted on Form 6-K:

... an issuer furnishing a report on this form shall furnish whatever information, not required to be furnished on Form 40-F or previously furnished, such issuer (i) makes or is required to make public pursuant to the law of the jurisdiction of its domicile or in which it is incorporated or organized, or (ii) files or is required to file with a stock exchange on which its securities are traded and which was made public by that exchange, or (iii) distributes or is required to distribute to its security holders.

The information required to be furnished pursuant to (i), (ii) or (iii) above is that which is material with respect to the issuer and its subsidiaries concerning: changes in business; changes in management or control; acquisitions or dispositions of assets; bankruptcy or receivership; changes in registrant's certifying accountants; the financial condition and results of operations; material legal proceedings; changes in securities or in the security for registered securities; defaults upon senior securities; material increases or decreases in the amount outstanding of securities or indebtedness; the results of the submission of matters to a vote of security holders; transactions with directors, officers or principal security holders; the granting of options or payment of other compensation to directors or officers; and any other information which the registrant deems of material importance to security holders.

This report is required to be furnished promptly after the material contained in the report is made public as described above.⁵⁴

⁵² The SEC's EDGAR website is located at <http://www.sec.gov/edgar.shtml>.

⁵³ Exhibit 7 includes a list of Barclays' filings with the SEC during the Class Period.

⁵⁴ <http://www.sec.gov/about/forms/form6-k.pdf>

Barclays also published its regulatory and financial information through the Regulatory News Service (RNS), the LSE's regulatory and financial communications channel,⁵⁵ and its financial statements were made available on Barclays' website.⁵⁶

40. The coverage of Barclays by securities analysts and the amount of reporting on Barclays during the Class Period indicate that company-specific news was widely disseminated to investors, thereby facilitating the incorporation of such information into the market price of Barclays' ADSs and London shares. Accordingly, this factor supports a conclusion that Barclays' ADSs and London shares traded in an efficient market throughout the Class Period.

C. Cammer Factor 3: Number of Market Makers and the Potential for Arbitrage

41. Factor 3 concerns the existence of market makers and arbitrageurs who can react quickly to news and facilitate trading. As discussed below, the fact that trading in Barclays was facilitated by a designated market maker and that arbitrage opportunities could have been exploited during the Class Period are evidence in support of market efficiency.

Market Makers

42. The NYSE, where Barclays was listed during the Class Period, uses a single designated market-maker ("DMM"), formerly known as a specialist, to maintain a competitive and efficient market for the securities assigned to them. DMMs are independent companies in corporate or partnership structures that have obligations to "quote at the NBBO [National Best Bid and Offer] a specified percentage of the time, and facilitate price discovery throughout the day as well as at

⁵⁵ <http://www.londonstockexchange.com/products-and-services/rns/about/rns-remove.htm>

⁵⁶ <http://www.home.barclays/barclays-investor-relations/results-and-reports/results.html>

the open, close and in periods of significant imbalances and high volatility.”^{57, 58} DMMs “manage a physical auction to combine with an automated auction that includes algorithmic quotes from other DMMs and market participants.”⁵⁹ DMMs are also required to meet stringent NYSE depth and continuity standards.⁶⁰ DMMs thus enable investors to trade promptly upon the arrival of new relevant information, allowing new information to be rapidly reflected in security prices. During most of the Class Period, the DMM for Barclays’ ADSs was Spear, Leeds and Kellogg Specialists, LLC, a subsidiary of Goldman Sachs as of 2000.⁶¹ In May 2014, IMC Chicago LLC (“IMC”), a unit of IMC Financial Markets, acquired Goldman Sachs’ designated market maker rights at the NYSE.⁶²

43. As stated by the U.S. Third Circuit Court of Appeals:

Securities markets like the NYSE and the NASDAQ are “open and developed,” ...and are therefore “well suited for application of the fraud on the market theory.”... Accordingly, the listing of a security on a major exchange such as the NYSE or the NASDAQ weighs in favor of a finding of market efficiency.⁶³

⁵⁷ “NBBO” is the national best bid and offer prices for a security available in all exchanges and market makers at any given time.

⁵⁸ http://www.nyse.com/pdfs/fact_sheet_dmm.pdf.

⁵⁹ <http://usequities.nyx.com/membership/nyse-equities/types>

⁶⁰ *Id.*

⁶¹ Source: NYSE Post & Panel File (containing Symbol, Company Name, CUSIP, Specialist information and the Post and Panel locations for all NYSE and NYSE MKT stocks).

Effective January 14, 2005, Spear, Leeds & Kellogg, L.P., was renamed Goldman Sachs Execution & Clearing, L.P. (<http://www.goldmansachs.com/media-relations/press-releases/archived/2004/2004-12-20.html>)

⁶² *The Wall Street Journal*, “Dutch Firm to Buy Goldman Sachs NYSE Floor Trading Business,” May 21, 2014. (Available at <http://www.wsj.com/articles/SB10001424052702303749904579576530862652294>)

⁶³ *In re DVI, Inc. Sec. Litig.*, 639 F.3d at 634, *quoting Oran*, 226 F.3d at 282; *see also Schleicher*, 618 F.3d at 682; *Freeman*, 915 F.2d at 199.

44. The London Stock exchange also employs registered market makers who are obliged to follow the LSE rules associated with the role, including the basic requirement “to make prices and deal either on the order book, off the order book or both.”⁶⁴ The LSE lists the following firms as market makers for Barclays’ London shares: (i) Peel Hunt LLP; (ii) Shore Capital Stockbrokers Ltd.; (iii) UBS Limited; and (iv) Winterflood Securities Ltd.⁶⁵

Arbitrage Activity

45. Related to *Cammer* Factor 3 is the existence of arbitrageurs, who are generally understood to be sophisticated investors who can act rapidly to take advantage of pricing discrepancies and thus ensure that market prices reflect all public information, the fundamental hallmark of market efficiency.⁶⁶ The level of short interest, the high degree of institutional

⁶⁴ <http://www.londonstockexchange.com/traders-and-brokers/rules-regulations/market-making/market-making.htm>

⁶⁵ <http://www.londonstockexchange.com/products-and-services/trading-services/trading-services.htm> (Registered Market Makers by Security.xls)

⁶⁶ Arbitrage has been defined as:

... the process of earning riskless profits by taking advantage of differential pricing for the same physical asset or security. As a widely applied investment tactic, arbitrage typically entails the sale of a security at a relatively high price and the simultaneous purchase of the same security (or its functional equivalent) at a relatively low price.

Arbitrage activity is a critical element of modern, efficient security markets. Because arbitrage profits are by definition riskless, all investors have an incentive to take advantage of them whenever they are discovered. Granted, some investors have greater resources and inclination to engage in arbitrage than others. However, it takes relatively few of these active investors to exploit arbitrage situations and, by their buying and selling actions, eliminate these profit opportunities. (See Sharpe, William F., et al., *Investments*, Prentice Hall, 1999, 6th Ed., p. 284.)

ownership and the tightness of bid/ask spreads for Barclays' ADSs suggest that arbitrage activity was prevalent during the Class Period.

46. One way in which arbitrageurs can exploit mispricing in the market is by engaging in short-sale transactions. A short sale is a transaction in which an investor sells a stock that he or she does not own and then purchases that stock back in the future. If the price declines between the time a security is sold short and the time it is purchased, the short seller realizes a gain. Thus, short selling is an advantageous strategy if an arbitrageur expects a security's price to decline in the future.⁶⁷ Furthermore, short sales allow arbitrageurs that currently do not own a security to convey their negative opinions to the market, thereby helping the market to achieve a consensus as to that security's fair value given all publicly available information.

47. Arbitrageurs were not constrained in their ability to short Barclays' ADSs. Economist Gene D'Avolio has summarized the market for short-selling in the United States by examining data from April 2000 to September 2001.⁶⁸ D'Avolio estimates that in the second quarter of 2001, as much as one-quarter of the U.S. market capitalization was available as loan supply for short-selling and that 7% of that capacity was utilized. D'Avolio also finds that short interest was, on average, 2.3% of shares outstanding. Furthermore, Jain et al. (2013) finds that the ADSs of U.K. companies had an average short interest equal to 0.55% of share float during the period July 2006 to January 2010.⁶⁹ During the Class Period, NYSE-listed stocks had an average

⁶⁷ Berk, Jonathan and Peter DeMarzo, *Corporate Finance*, Pearson Education, Inc., 2007, 1st Ed., Ch. 11, p. 339.

⁶⁸ D'Avolio, Gene, 2002, "The market for borrowing stock," *Journal of Financial Economics*, Vol. 66, pp. 271–306.

⁶⁹ Jain, Archana, Pankaj K. Jain, Thomas H. McNish and Michael McKenzie, 2013, "Worldwide reach of short selling regulations," *Journal of Financial Economics*, Vol. 109, pp. 177–197.

short interest equal to 3.17% of total shares outstanding.⁷⁰ In comparison, the average short interest for Barclays' ADSs was 6.95% of total shares outstanding during the Class Period.^{71, 72, 73} These figures demonstrate that, relative to NYSE-listed stocks, short selling was not constrained for Barclays' ADSs during the Class Period.

48. Institutional ownership is another indicator of arbitrage activity in so far as institutional investors, such as pension funds, mutual funds and investment banks, are generally considered to be sophisticated investors that have ready access to minute-to-minute financial news and to online bulletins from analysts, such as those disseminated through First Call. Relative to individual investors, institutions have significantly greater resources with which to analyze financial information pertinent to the securities in which they invest. Institutional ownership implies that company-specific financial information is actively reviewed by investment professionals, who in turn make buy/sell recommendations to their firm and/or client investors.

⁷⁰ See Exhibit 8A for a calculation of NYSE short interest as a percentage of total NYSE shares outstanding per month.

⁷¹ FINRA (the Financial Industry Regulatory Authority) was created in July 2007 from the consolidation of the NASD and various regulatory functions of the NYSE. It is a non-governmental organization that regulates member brokerage firms and exchange markets, and is overseen by the SEC, the ultimate regulator of the U.S. securities industry, including FINRA.

Pursuant to FINRA Rule 4560, FINRA member firms are required to report total short positions in all customer and proprietary firm accounts in all NASDAQ, NYSE, NYSE MKT, NYSE Arca, BATS, and OTC equity securities to FINRA on a bi-monthly basis. Short position filings are made online via the Regulation Filing Applications (RFA) system at <https://regfiling.finra.org>. Short position reports filed by member firms include the relevant exchange/market code, issue symbol, security name, and number of common shares, preferred shares, warrants, units or ADRs short for the current reporting period as of the designated settlement date. (See <http://www.finra.org/Industry/Compliance/RegulatoryFilings/ShortInterestReporting/P037072>.)

⁷² See Exhibit 8B for reported monthly short interest of Barclays' ADSs.

⁷³ Given my understanding that short interest data are not available for LSE-listed stocks, only figures for the ADSs are presented here.

In this way, the market price of a security is bid up or down to reflect all publicly available information, as interpreted by institutional investors. Moreover, because shares held by institutions are often available to borrow by short sellers, a high degree of institutional ownership relative to the level of short interest indicates a lack of short-sale constraints, thereby facilitating market efficiency by permitting short sales by arbitrageurs.⁷⁴

49. According to data provided by Thomson Financial, for the quarters ended in the Class Period, institutional holdings of Barclays' ADSs ranged from 63.7% to 90.2% of shares available and over 200 institutional investors held Barclays' ADSs at the end of each quarter during the Class Period.⁷⁵ Institutional holdings of Barclays' London shares ranged from 48.9% to 67.9% of shares available and over 500 institutional investors held Barclays' London shares at the end of each quarter during the Class Period.⁷⁶ Additionally, the fact that institutional holdings were more than 9 times the short interest in Barclays' ADSs implies that short selling was not constrained during the Class Period.

50. Another indicator of the potential for arbitrage activity to correct market inefficiencies (*i.e.*, arbitrage opportunities) is the size of bid/ask spreads. Bid/ask spreads are a measure of transaction costs and low transaction costs indicate that arbitrage opportunities can be exploited readily. As shown in the following table, the average and median bid/ask spreads on Barclays' ADSs and London shares during the Class Period were comparable or tighter than those of a

⁷⁴ Asquith, Paul, Parag A. Pathak and Jay R. Ritter, 2005, "Short interest, institutional ownership and stock returns," *Journal of Financial Economics*, Vol. 78, pp. 243–76.

⁷⁵ Institutions which file Form 13F with the SEC report shares held as of the end of each calendar quarter. See Exhibit 9A for a summary of institutional holdings for Barclays' ADSs during the Class Period.

⁷⁶ See Exhibit 9B.

random sample of stocks listed on the NYSE and a random sample of stocks listed on the LSE, respectively.⁷⁷

Barclays ADS	NYSE Sample Average/Median	Barclays London Shares (BARC)	LSE Sample Average/Median
\$0.02 / \$0.01	\$0.02 / \$0.01	0.08p / 0.05p	3.53p / 3.12p

51. The fact that the bid/ask spreads on Barclays' ADSs and London shares were comparable to those of stocks listed on the NYSE and the LSE is evidence in support of my conclusion that the markets for these securities were efficient during the Class Period.

D. Cammer Factor 4: Eligibility to File SEC Form S-3

52. Form S-3 is a simplified registration form that may be used by U.S. companies that meet the following requirements:

- a. it has been subject to the Securities Exchange Act of 1934 reporting requirements for more than one year;
- b. it has filed all required documents in a timely manner during the prior twelve months;
- c. it has not, since the last audited statements, failed to pay required dividends or sinking fund installments on preferred stock, or defaulted on debts or material leases.
- d. it meets certain minimum stock requirements.^{78, 79}

⁷⁷ The bid/ask spread analysis reported in Exhibit 10 compares the bid/ask spreads of BCS shares and BARC shares on each day during the Class Period to those of 100 randomly selected NYSE-listed stocks and 100 randomly selected LSE-listed stocks, respectively.

⁷⁸ <http://www.sec.gov/about/forms/forms-3.pdf>.

⁷⁹ Prior to January 28, 2008, the SEC required a minimum of \$75 million in stock be held by non-affiliates. Effective January 28, 2008, a company with a non-affiliate public float of less than \$75 million is permitted to file form S-3 with certain restrictions. (*See* Securities and Exchange Commission, 17 CFR Parts 230 and 239 [Release No. 33-8878; File No. S7-10-07], RIN 3235-AJ89, Revisions to the Eligibility Requirements for Primary, Securities Offerings on Forms S-3 and F-3.)

Companies eligible for filing on Form S-3 are permitted to incorporate prior filings by reference into current filings, and need not repeat such information since it is already widely publicly available.

53. It is the SEC's view that these S-3 eligible companies—those that disclose financial information to the SEC and issue press releases to the public—have already disseminated information to the marketplace, and, therefore, that the market operates efficiently for them.⁸⁰

Certain courts have also stated that the ability to file Form S-3 is an indicator of market efficiency:

Corporations permitted to use the S-3 form are thus presumed to be actively traded and widely followed. *See Harman*, 122 F.R.D. at 525. Therefore, a company's ability to file an S-3 Registration Statement points to market efficiency.⁸¹

54. The *Cammer* court also discussed the relationship between S-3 eligibility and efficiency, noting that “[t]he issue is not whether Coated Sales recently completed a public offering, but whether, if it did, it would enjoy the benefit of making abbreviated prospectus disclosure because the SEC viewed it to be in an efficient market where documents ‘on file’ could be deemed to be known by the investment community.”⁸²

55. Form F-3 for foreign issuers in the U.S. is the functional equivalent to Form S-3 used by U.S. issuers. The registrant requirements in Form F-3 are essentially identical to the Registrant

⁸⁰ SEC Securities Act Release No. 6331 (August 18, 1981), pp. 5, 6.

⁸¹ *Krogman v. Sterritt* 202 F.R.D. 467 (N.D. Tex. 2001) at 476.

⁸² *Cammer*, 711 F. Supp. at 1284.

Requirements in Form S-3.⁸³ Barclays filed Form F-3ASR (“automatic shelf registration statement of securities of well-known seasoned issuers”) before and during the Class Period (on May 3, 2011 and on May 2, 2014).⁸⁴ In addition, Barclays’ subsidiary, Barclays Bank, filed Form F-3ASR during the Class Period on July 19, 2013.⁸⁵ That Barclays was eligible to file Form F-3 during the Class Period supports my conclusion that the market for its stock was efficient during the Class Period.

E. *Cammer* Factor 5: Empirical Facts Showing a Cause-and-Effect Relationship Between Unexpected Corporate Events or Financial Releases and an Immediate Reaction in the Price of Barclays’ ADSs

56. *Cammer* Factor 5 relates to how a security reacts to new information and states:

... one of the most convincing ways to demonstrate [market] efficiency would be to illustrate, over time, a cause and effect relationship between the company disclosures and resulting movements in stock price.⁸⁶

57. A direct test of market efficiency is to conduct what is known as “an event study” to examine whether security prices respond to material new information released to the market.⁸⁷

An event study is commonly used in securities litigation, as well as academic research, and comprises numerous steps, including: the *a priori* definition and selection of events to study; identification of a study period; estimation of a regression model to remove non-company-

⁸³ For F-3 eligibility requirements: <https://www.sec.gov/about/forms/formf-3.pdf>; Form S-3 eligibility requirements: <https://www.sec.gov/about/forms/forms-3.pdf>

⁸⁴ Edgar Pro (pro.edgar-online.com)

⁸⁵ *Id.*

⁸⁶ *Cammer*, 711 F. Supp. at 1292.

⁸⁷ It is important to note that material information is new once, *i.e.*, once incorporated into the market mix of information with subsequent price reaction, successive announcements of the same information will have no additional effect on share price.

specific effects from the security's return; testing for statistical significance; and interpretation of empirical results.⁸⁸ Some variation in approaches to event studies is permitted.⁸⁹

58. I performed a standard event study for both Barclays' ADSs and London shares to determine whether unexpected corporate events or financial releases promptly caused a measurable stock price reaction after accounting for contemporaneous market and industry effects.⁹⁰ As set forth in Exhibit 11, my event study clearly demonstrates a cause-and-effect relationship between unexpected Company disclosures and resulting movements in Barclays' share prices during the Class Period. The regression analyses used in the event study are described in Appendix A and Exhibit 12. A chronology of all news published during the Class Period is provided in Exhibit 13, which displays each date during the Class Period with titles of

⁸⁸ As described by Mitchell and Netter:

The execution of an event study is quite simple. It involves the identification of an event that causes investors to change their expectations about the value of a firm. The investigator compares a stock price movement contemporaneous with the event to the expected stock price movement if the event had not taken place. There are three basic steps in conducting an event study: (i) define the event window; (ii) calculate abnormal stock price performance around the event; and (iii) test for statistical significance of the abnormal stock price performance. (See Mitchell, Mark L. and Jeffry M. Netter, 1994, "The Role of Financial Economics in Securities Fraud Cases: Applications at the Securities and Exchange Commission," *The Business Lawyer*, Vol. 49, p. 557–558.)

⁸⁹ However, "[w]hile there is no unique structure, the analysis can be viewed as having seven steps." Those steps are event definition, selection criteria, normal and abnormal returns, estimation procedure, testing procedure, empirical results, and interpretation and conclusion. (See Campbell, John Y., Andrew W. Lo, and A. Craig MacKinlay, *The Econometrics of Financial Markets*, Princeton University Press, 1997, pp. 150–152.)

⁹⁰ The residual returns calculated for my event study are based on close-to-close prices. As the closing price for the ADSs is established approximately five hours later than the closing price for the London shares, the residual returns of the ADSs and the London shares may reflect different information sets on a given day.

news articles (including Company press releases),⁹¹ indication of SEC filings, and titles of analyst reports.⁹²

59. To determine which events to include in my analysis, I relied on my knowledge of a large body of event study literature that has evaluated what types of information affect stock prices. Specifically, I examined dates on which Barclays released quarterly or year-end financial results. Such earnings-related news announcements are an easily identified and objective set of events to examine, which has been shown in the academic finance literature to impact stock prices.⁹³ In an effort to increase the number of unexpected corporate events under study, I also examined dates identified on Barclays' website as "Events and Presentations,"⁹⁴ as well as June 25–26, 2014, which is the end of the Class Period and the date of the first alleged corrective disclosure in this matter.⁹⁵

60. Exhibit 11 describes each of my selected event dates in detail and discusses how the observed price reactions are consistent with those expected in an efficient stock market.⁹⁶ In summary, Exhibit 11 contains 38 dates comprised of the following events:

⁹¹ Articles were obtained from Factiva. Only headlines are provided in Exhibit 13 in order to reduce the length of this exhibit.

⁹² The closing stock price and trading volume associated with each trading day listed in the chronology of news exhibit (*i.e.*, Exhibit 13) can be found in Exhibit 14.

⁹³ *See, e.g.*, Ball, R., and P. Brown, 1968, "An Empirical Evaluation of Accounting Income Numbers," *Journal of Accounting Research*, pp. 159–78.

⁹⁴ <http://www.barclays.com/barclays-investor-relations/results-and-reports/events-and-presentations.html>

⁹⁵ Complaint, ¶¶195–196.

⁹⁶ For each event date, the table contains the associated stock price movements, both observed and net of market and industry effects, and well as an indicator of statistical significance (**), which is measured using the 5% level of significance frequently employed by economists.

- a. Fourteen earnings-related disclosures: twelve quarter- or year-end Company earnings releases (second quarter 2011 through first quarter 2014, inclusive), and two earnings pre-announcements (October 18, 2012 and Barclays' 2014 Annual General Meeting on April 24, 2014);
- b. Two events related to Barclays' Group Strategy Update (May 8, 2014⁹⁷ and May 12, 2014);
- c. twenty-one corporate presentations, conferences or seminars; and
- d. one alleged corrective disclosure (June 25–26, 2014).

61. Out of the fourteen earnings-related disclosures I examined, nine (or 64.3%) are associated with a statistically significant Company-specific return (four positive statistically significant returns⁹⁸ and five negative statistically significant returns⁹⁹).¹⁰⁰ Furthermore, as

⁹⁷ The Company also released a strategic review on February 12, 2013, the same day it released its fourth quarter / year-end 2012 financial results.

⁹⁸ October 31, 2011; February 10, 2012; July 27, 2012; and February 12, 2013.

⁹⁹ October 31, 2012; April 24, 2013; July 30, 2013; February 11, 2014; and May 6, 2014.

For October 31, 2012 (third quarter 2012 earnings release), the U.S. exchanges were closed on Monday, October 29, 2012 and Tuesday, October 30, 2012 due to Hurricane Sandy. (<http://www1.nyse.com/press/1351243421978.html>) Thus a 1-day return is not available for the ADSs. However, the Company-specific return for the London shares, which is a 1-day return, is statistically significant and negative. Given the presence of confounding information during the October 26–30 period, the Company-specific return for the ADSs on October 31, 2012 is not solely reflective of the earnings release that day. Nonetheless, the five-day Company-specific return was negative 1.4%. Furthermore, as demonstrated in §VI.i., Barclays' ADSs and London shares traded in tandem on a minute-by-minute basis throughout the Class Period, suggesting that had the U.S. stock markets been open on October 30, 2012, the ADS return would have mimicked that of the London shares.

¹⁰⁰ There are a total of 729 trading days and 732 trading days during the Class Period for the ADS and the London shares, respectively. Approximately 6% of the trading dates in the Class Period are associated with statistically significant returns (42 dates for the ADSs and 41 dates for the London shares).

described in detail in Exhibit 11, my review of the news and analyst reports for these dates demonstrates that each of the statistically significant positive returns are associated with better-than-expected financial results and/or positive information contemporaneously released by the Company, and each of the statistically significant negative returns are associated with worse-than-expected financial results and/or negative information contemporaneously released by the Company. For the five earnings-related disclosures that are not associated with statistically significant Company-specific returns,¹⁰¹ the Company's earnings results were generally in line with market expectations, and/or the results were largely mixed, such that the insignificant returns are consistent with that expected in an efficient market. Thus, my event study finds that a strong cause-and-effect relationship existed between the Company's earnings-related disclosures and resulting stock price movements: 100% of the Company's material, unexpected earnings-related disclosures resulted in a statistically significant price reaction for Barclays' stock.

62. More specifically, for two of the four earnings release dates with positive statistically significant Company-specific returns (October 31, 2011 and July 27, 2012), the Company's reported financial results were better than expected by the market. For February 10, 2012, earnings results were mixed. However, analysts reacted positively to the Company's financial performance despite the industry downturn particularly within its Investment Banking division, as well as to the Company's outlook statement. With respect to the fourth date, February 12, 2013, the Company released its year-end 2012 results, which were generally in-line with expectations. However, that same day, the Company released its strategic review, and the analysts' reaction to the review was overwhelmingly positive. Thus, the statistically significant

¹⁰¹ August 2, 2011; April 26, 2012; October 18, 2012; October 30, 2013; and April 24, 2014.

increase in the price of Barclays' stock on February 12, 2013 is consistent with that expected in an efficient stock market.

63. Regarding the five earnings release dates with negative statistically significant Company-specific returns, for three of these dates (April 24, 2013, February 11, 2014 and May 6, 2014), the Company's financial results were worse than expected by the market. With respect to October 31, 2012, the Company's earnings results were generally in line with expectations. However, that same day, the Company also disclosed two new investigations into its business practices by U.S. authorities. In addition, the market expressed concerns over the Company's capital ratios, the performance of its Investment Banking division, and Barclays' cautious outlook statement. For the fifth date, July 30, 2013, Barclays released its second-quarter 2013 earnings which were slightly below expectations, and the Company also disclosed a £5.8 billion rights issue. While a rights issue was expected, the size of the issue was much larger than anticipated. Given that equity issuance is typically associated with statistically significant negative share price reactions,¹⁰² the statistically significant negative Company-specific return on July 30, 2013 is consistent with that expected in an efficient market.

64. Regarding the April 24, 2014 Annual General Meeting, the Company provided "a few points" regarding its yet-to-be released first quarter financial performance.¹⁰³ Included in its remarks, Barclays stated that there would be a "small reduction in adjusted profit before tax for the Group." However, its statements regarding its first quarter earnings results were considered

¹⁰² Brealey, Richard A., Stewart C. Myers and Franklin Allen, *Principles of Corporate Finance*, 8th ed., McGraw-Hill Irwin, 2006, pp. 399–401.

¹⁰³ AGM Statement (available at <http://www.barclays.com/content/dam/barclayspublic/docs/InvestorRelations/IRNewsPresentations/2014Presentations/24-april-agm-statements.pdf>)

by analysts to be in line with expectation, and the statistically insignificant company-specific stock price change on April 24, 2014 is consistent with that expected in an efficient stock market.

65. With respect to May 8, 2014, analysts' reaction to the Company's strategy update, including Barclays' decision to significantly cut its Investment Banking division, was overwhelmingly positive. Accordingly, the positive statistically significant Company-specific return on May 8, 2014 is consistent with that expected in an efficient stock market. A few days later, May 12, 2014, the Company hosted an Analysts Breakfast Meeting to discuss the strategic review, which did not contain new material information. However, that same day, two widely-know investment firms, RBC Capital Markets and Exane BNP Paribus, downgraded the Company's stock. That day, Company-specific stock price decline for the ADSs and London shares was statistically significant at the 5% and 6.2% levels of significance, respectively.¹⁰⁴

66. Of the 21 conferences and presentations examined, none of these dates were associated with statistically significant Company-specific stock returns. However, upon further examination of the news on these dates, it is clear that the insignificant market reaction to these events is consistent with that expected in an efficient stock market. Specifically, the materials associated with the conferences (*e.g.*, copies of presentation slides and transcripts of remarks and Q&A sessions), which Barclays regularly made available the same day on its website, typically contained financial information that was previously released to the market. In fact, in the

¹⁰⁴ The p-value of the Company-specific return on May 12, 2014, under the Student's *t*-distribution with 250 degrees of freedom, is 1.5% and 6.2% for the ADSs and London shares, respectively. Differences in daily close-to-close returns are expected in an efficient market, given the different information set available at the U.S.-market close, which is five hours later than the London-market close. As demonstrated in §VI.i., Barclays' ADSs and London shares traded in tandem on a minute-by-minute basis when the two markets were open simultaneously.

majority of the Company's announcements of these events Barclays stated that such documents contained "no material new information."¹⁰⁵ In addition, for most of these conference/presentation dates, there was little to no analyst coverage and/or news commentary.¹⁰⁶

¹⁰⁵ See Exhibit 11 for citations to the Company's announcements of these events. The Company's statement that the documents did not contain material new information was in its announcement of 15 of these events. With respect to the remaining 6 dates (March 14, 2012, May 30, 2012, November 29, 2012, December 6, 2012, November 12, 2013, and November 21, 2013), the presentations were generally based on previously released financial information, and there was little to no analyst commentary in response to these presentations.

I note that JPMorgan published a report on November 29, 2012 recommending investors buying Barclays Feb-13 call spreads to participate in the potential restructuring ahead of Barclays upcoming investor day. However, JPMorgan made the same investment recommendation three days earlier on November 26, 2012.

UBS published a report on November 13, 2013 in which it summarized the November 12, 2013 Barclaycard presentation, but it maintained its ratings and projections for the Company.

I also note that the December 6, 2012 presentation was regarding the strategic combination of Barclays' African operations with Absa." However, Barclays and Absa had already announced that they were in discussions about the combination on August 21, 2012. (See SEC Form 6-K, filed August 21, 2012, 6:21AM.) I did not identify any analyst reports issued in response to the December 6, 2012 announcement of the business combination.

¹⁰⁶ As described further in Exhibit 11, there were analyst reports issued on four of these dates (*i.e.*, May 30, 2012, August 30, 2012, September 10, 2012, and June 28, 2013). However, the analysts' commentary is consistent with the fact that there was not a statistically significant stock price reaction on these dates.

After the May 30, 2012 UK Retail and Business Banking Presentation, analysts concluded that the event reaffirmed existing estimates.

Several analysts issued reports on August 30, 2012, the date of the Nomura Financial Services Conference. However, analyst reports issued on August 30, 2012 were in response to the Company's announcement that same day that Anthony Jenkins (then head of Barclays' Retail and Business Banking division) was named Group Chief Executive of Barclays, effective immediately. The appointment had been widely anticipated.

September 10, 2012 was Mr. Jenkins' first speech after being named Group CEO. However, he stated that a strategic plan would not be presented until first quarter 2013 following a review of each business unit.

67. Finally, as discussed below (¶¶74–75) and in Exhibit 11, the significant decline in the price of Barclays' stock on June 26, 2014 was caused by the announcement of the New York Attorney General's lawsuit against Barclays alleging that the Company had engaged in fraudulent activity related to its dark pool stock-trading venue. This observed cause-and-effect dynamic is consistent with that expected in an efficient stock market.

68. Based on the event studies performed, I find that Barclays' stock price reflected the information disclosed to the market, and promptly responded to material, unexpected news, which supports my conclusion that the markets for Barclays' ADSs and London shares were efficient during the Class Period.

F. Additional Factor 1: Market Capitalization

69. Courts have found that a large market capitalization (*i.e.*, the total value of a company's equity) may be an indicator of market efficiency because investors have a greater incentive to purchase in more highly capitalized corporations.¹⁰⁷ I have discussed above the fact that Barclays' securities exhibited a high degree of institutional ownership and were widely followed by analysts. This is consistent with Barclays' relatively high market capitalization. The market capitalization of Barclays' stock ranged from a high of \$78.9 billion in January 2014 to low of \$26.1 billion in September 2011.¹⁰⁸

Several analysts issued reports on June 28, 2013 following the Company's Investment Bank presentation. The analyst reports were primarily focused on the Company's ability to meet the PRA 3% Leverage Ratio target. The Company's statements regarding its ability to achieve the target by certain deadlines were generally in line with analysts' expectations. The Company also reiterated the financial projections for its Investment Banking division.

¹⁰⁷ *In re DVI, Inc. Sec. Litig.*, 249 F.R.D. 196, 212 (E.D. Pa 2008), *aff'd* 659 F.2d 623 (3d Cir. 2011), *quoting Krogman*, 202 F.R.D. at 478.

¹⁰⁸ *See* Exhibit 4.

70. By comparison, during the Class Period, the median market capitalization of the roughly 1,700 companies listed on the NYSE ranged from \$2.2 billion to \$3.3 billion. The median market capitalization of the roughly 1,500 companies listed on the LSE ranged from \$49.1 million to \$87.6 million. Barclays' equity market capitalization was greater than 92% and 98% of NYSE- and LSE-listed stocks during the Class Period, respectively. According to the *DVI* Court, a finding of "high market capitalization as compared to the broader survey of publicly traded companies weighs in favor of a finding of market efficiency."¹⁰⁹

G. Additional Factor 2: Public Float

71. Courts have held that a large public float percentage (*i.e.*, the percentage of shares outstanding held by the public rather than insiders) may be an indicator of market efficiency.¹¹⁰ During the Class Period, there were between 87.1 million and 133.4 million Barclays ADSs outstanding. There are no reported insider holdings for the ADSs during the Class Period,¹¹¹ thus the public float for Barclays' ADSs was 100% of shares outstanding during the Class Period.¹¹² More broadly, there were between 12.2 billion and 16.4 billion total ordinary shares outstanding during the Class Period, and insiders held between 30.8 million and 46.3 million of these shares during the Class Period. Accordingly, the public float of Barclays' ordinary shares was over 99.6% of total ordinary shares outstanding throughout the Class Period.¹¹³

¹⁰⁹ *In re DVI, Inc. Sec. Litig.*, 249 F.R.D. 196, 212 (E.D. Pa 2008), *aff'd* 659 F.2d 623 (3d Cir. 2011).

¹¹⁰ *Unger*, 401 F.3d at 323; *Bell*, 422 F.3d at 313 n.10; *Krogman*, 202 F.R.D. at 478; *O'Neil*, 165 F.R.D. at 503.

¹¹¹ Source: Thomson Financial.

¹¹² See Exhibit 15.

¹¹³ *Id.*

72. The fact that almost all of the ADS and London shares were held by the public as opposed to Company insiders throughout the Class Period supports a conclusion that Barclays' ADS and London shares traded in efficient markets during that time.

H. Additional Factor 3: Autocorrelation

73. Courts have found that a lack of autocorrelation in security returns may be an indicator of market efficiency since "if new information about a company is incorporated slowly into the price of a security, then the security will exhibit autocorrelation, suggesting an inefficient market."¹¹⁴ The first-order autocorrelation coefficient for Barclays' ADS returns, which measures the correlation between a given trading day's (day t 's) return and the return from the previous trading day (day $t-1$), was a statistically insignificant -0.052 during the Class Period.¹¹⁵ The first-order autocorrelation coefficient for Barclays' London share returns was a statistically insignificant 0.012 during the Class Period.¹¹⁶ Thus, neither Barclays' ADSs nor London shares exhibited autocorrelation during the Class Period, suggesting they traded in efficient markets during that time.

VII. Price Impact

74. The circuit court decision on appeal in *Halliburton II* defined price impact as follows: "Price impact can be shown either by an increase in price following a fraudulent public statement

¹¹⁴ *In re DVI, Inc. Sec. Litig.*, 249 F.R.D. 196, 213 (E.D. Pa 2008), *aff'd* 659 F.2d 623 (3d Cir. 2011); *see also In re PolyMedica Corp. Secs. Litig.*, 453 F.Supp.2d 260, 276-77 (D. Mass. 2006).

¹¹⁵ See Exhibit 16.

¹¹⁶ *Id.*

or a decrease in price following a revelation of the fraud.”¹¹⁷ The Complaint alleges that the first corrective disclosure occurred on June 25, 2014.¹¹⁸ That day, at 4:00PM ET, the New York Attorney General, Eric Schneiderman, “issued a press release announcing a lawsuit against Barclays, arising from the operation of Barclays’ dark pool. The NYAG also held a conference that day discussing the lawsuit.”¹¹⁹ As shown in Exhibits 11 and 12, Barclays’ shares experienced a statistically significant Company-specific price decline on June 26, 2014 in response to this news; the Company-specific return for the ADSs was -7.2% (with a *t*-statistic of -5.7) and the Company-specific return for the London shares was -6.3% (with a *t*-statistic of -5.0).^{120, 121} Trading volume on June 26, 2014 was approximately 28.3 million for the ADSs and 646.1 million for the London shares, which is over 7 times and 4.5 times the average daily trading volume during the Class Period for each security, respectively. I have not identified any confounding negative events that would have contributed to the Company-specific stock price

¹¹⁷ *Erica P. John Fund, Inc. v. Halliburton Co.*, 718 F.3d 423, 434 (5th Cir. 2013) *vacated and remanded on other grounds*, 134 S. Ct. 2398 (U.S. 2014). This definition was not challenged in the appeal.

¹¹⁸ Complaint, ¶¶195–196.

¹¹⁹ NYAG Press Release, June 25, 2014, entitled “A.G. Schneiderman Announces Fraud Charges Against Barclays In Connection With Marketing And Operation Of Its Dark Pool; Investigation Into Barclays’ Dark Pool And Electronic Trading Business Uncovered An Alleged Pattern Of Fraud And Deceit, Misrepresentations to Investors.” The NYAG press release and a video of the news conference are available at <http://www.ag.ny.gov/press-release/ag-schneiderman-announces-fraud-charges-against-barclays-connection-marketing-and>.

¹²⁰ If the *t*-statistic is greater than or equal to 1.97 or less than or equal to -1.97, the difference between the two returns is significantly different from zero at the 5% level of significance. (See note 133.)

¹²¹ The residual returns calculated for my event study are based on close-to-close prices. As the closing price for the ADSs is established approximately five hours later than the closing price for the London shares, the residual returns of the ADSs and the London shares may reflect different information sets on a given day.

decline on June 26, 2014. Thus, my event study clearly demonstrates the price impact of the alleged misrepresentations described in the Complaint.

75. The Supreme Court stated in *Halliburton II* that “market efficiency” is an indirect proxy for “price impact.”¹²² That price impact is also evident in Barclays’ ADSs and London shares supports my finding that the markets for these securities were generally efficient during the Class Period.

VIII. Damages for Purchasers of Barclays’ ADS During the Class Period Can be Calculated on a Class-wide Basis

76. I was not asked to provide an opinion on loss causation or to calculate class-wide damages in this matter. However, I was asked to opine on whether damages for investors who purchased the ADSs during the Class Period can be calculated on a class-wide basis. Although damages, if any, for each individual class member may vary, the method of calculating damages is common to the class. In what follows, I set forth the general economic framework for quantifying per-security damages on a class-wide basis.

77. An investor incurs damages when a security is acquired at a price inflated as a result of false or misleading statements or omissions, provided that a later corrective disclosure of that fraud causes the price of that security to decline. Price inflation in a security can be created by material misrepresentations and/or omissions on or before the date of purchase, which remain uncorrected in whole or in part at the time of purchase. Damages may be mitigated if the security is later sold while the price remains inflated, so that the original purchaser receives at sale an offsetting “bonus” equal to the amount of inflation remaining at the date of sale.

¹²² *Halliburton II*, 134 S. Ct. at 2404.

78. Price inflation may be measured by analyzing the change in a security's price caused by a corrective disclosure and/or materialization of a concealed risk. The decline in a security's price in response to corrective disclosures reflects the dissipation of price inflation created by earlier misrepresentations and/or omissions. An event study can be used to isolate firm-specific price movements from movements caused by outside factors, such as changes in market and/or industry conditions. This analysis would apply equally to all Class members.

79. Once the decline caused by the corrective disclosures has been determined, the daily level of price inflation can be calculated throughout the Class Period. A class-member's actual trading activity in the security can be used to calculate damages on an individual basis. For each class member, damages incurred on a security acquired during the Class Period and retained through the end of the Class Period are equal to the amount of inflation at purchase. For a security acquired during the Class Period and sold later in the Class Period, damages are the price inflation at purchase minus the price inflation at sale. Given my understanding of the Supreme Court's ruling in *Dura*,¹²³ a security purchased during the Class Period and sold before the first corrective disclosure is ineligible for damages.

80. Per-security damages should also incorporate the so-called "90-day lookback" provision of the Private Securities Litigation Reform Act of 1995 ("PSLRA"). The provision applies such that losses on securities purchased during the Class Period and sold after the 90-day lookback period cannot exceed the difference between the purchase price paid for the security and the average price of the security during the 90-day lookback period. Damages incurred by purchasers of Barclays' ADSs during the Class Period can be calculated on a class-wide basis in this manner.

¹²³ *Dura Pharm., Inc. v. Broudo*, 544 U.S. 336 (2005) ("*Dura*").

IX. Conclusion

81. In summary, the markets for Barclays' ADSs and London shares were efficient throughout the Class Period; the statistically significant Company-specific price declines on June 26, 2014 demonstrate that the alleged misrepresentations described in the Complaint had price impact; and damages for investors who purchased Barclays' ADSs during the Class Period can be calculated using a method that is common to the class.

82. My work in this matter is ongoing. My opinions in this report are subject to refinement or revision based on analysis of new information which may be provided to me, including the opinions of other experts and receipt of additional documents and data, and based on further analysis of the data and materials described herein. Should additional relevant information be provided to me, my opinions may be supplemented at a later date.

Executed on July 17, 2015, at Redwood City, California.



Zachary Nye, Ph.D.

Appendix A: Description of Regression Analysis

83. For the purposes of examining market efficiency, I have conducted an event study to determine whether Barclays' earning-related disclosures promptly caused a measurable stock price reaction after accounting for contemporaneous market and industry effects. In an effort to isolate company-specific effects that influenced Barclays' share price during the Class Period, I performed a regression analysis to measure the relationship between Barclays' share price returns and 1) changes in market-wide factors that would be expected to impact all stocks; and 2) changes in industry-wide factors that would be expected to impact stocks in the U.K. banking industry. By measuring how Barclays' stock returns move in relation to an overall market index and an industry index, I can also measure how it responds to company-specific news.

84. For each event studied, the "Control Period" used to estimate the regression equation is the calendar year immediately preceding the impact date (*i.e.*, the first trading day on which the information disclosed could have impacted the market price).^{124, 125} The market index used for

¹²⁴ Mitchell, Mark L. and Jeffry M. Netter, 1994, "The Role of Financial Economics in Securities Fraud Cases: Applications at the Securities and Exchange Commission," *The Business Lawyer*, Vol. 49, pp. 545–590 at p. 568:

The market model is estimated with regression analysis. The estimation period for this market model equation typically ranges from 100 to 300 trading days preceding the event under study.

¹²⁵ MacKinlay, A. Craig, 1997, "Event Studies in Economics and Finance," *Journal of Economic Literature*, Vol. 35, pp. 13–39 at p. 15:

Given the selection of a normal performance model, the estimation window needs to be defined. The most common choice, when feasible, is using the period prior to the event window for the estimation window. For example, in an event study using daily data and the market model, the market model parameters could be estimated over the 120 days prior to the event. Generally the event period itself is not included in the estimation period to prevent the event from influencing the normal performance model parameter estimates.

the ADS regressions is the S&P 500, which “includes 500 leading companies and captures approximately 80% coverage of available market capitalization.”¹²⁶ The market index used for the London share regressions is the FTSE 100, which includes “the 100 most highly capitalized companies on the London Stock Exchange.”¹²⁷ These broad-based market indices are commonly used by economists as a representation of the overall market and the data are provided by Bloomberg.

85. In addition to market-wide factors, my regression analysis also measures the relationship between Barclays’ stock returns and changes in industry-wide factors that would be expected to impact all stocks in Barclays’ particular industry. In constructing the industry index, I considered all companies included in the FTSE 350 Banks Index.^{128, 129} To be included in the industry index, a company’s stock must have pricing information available throughout the Class Period and have been traded on both a U.S. exchange (for the ADSs) and the LSE (for the London shares).¹³⁰ Furthermore, to be included in the industry index, the residual stock returns

¹²⁶ <http://www.spindices.com/indices/equity/sp-500>.

¹²⁷ Bloomberg.

¹²⁸ According to Bloomberg, “the FTSE 350 Banks Index is a capitalization-weighted index of all stocks designed to measure the performance of the banking sector of the FTSE 350 Index.”

¹²⁹ According to Bloomberg, “the FTSE 350 [Index] is a capitalization-weighted index comprising [*sic*] of all the components of the FTSE 100 and the FTSE 250. The index represents approximately 90% of the U.K. equity market by capitalization.”

¹³⁰ Given time differences between closing prices observed on stock exchanges in different countries, which can bias regression results due to the so called “nonsynchronous trading effect,” stocks traded on other foreign exchanges have been excluded from my regression analysis. Nonsynchronous trading effects “can create a false impression of predictability in price changes and returns even if true price changes or returns are statistically independent.” (See Campell, John Y., Andrew W. Lo and A. Craig MacKinlay, *The Econometrics of Financial Markets*, Princeton University Press, 1997, 2nd Ed., p. 84)

of the company¹³¹ must exhibit a statistically significant positive association with Barclays' stock returns during the Class Period; otherwise, the returns of the industry peer do not add to the power of the regression to explain Barclays' stock returns.¹³²

86. My estimated regression equations for the ADSs and London shares are provided in Exhibit 12B and 12D, respectively. As indicated by the *t*-statistics corresponding to each index, Barclays' stock returns exhibited a statistically significant association with both market index returns and residual industry index returns during each Control Period.¹³³ Exhibits 12A and 12C shows Barclays' expected and residual returns estimated from the regression model on each day of the Class Period. Expected returns are those changes in stock prices due to market and industry factors that change the values of all stocks in an economy (market effects) or in a particular industry (industry effects). Barclays' residual returns are a measure of the change in the stock price due to company-specific events and are calculated as the difference between Barclays' actual return and its expected return.¹³⁴

¹³¹ Residual stock returns are the portions of daily stock returns which are not explained by market effects, as determined from a regression of a company's stock returns on a market index (*e.g.*, S&P 500) returns.

¹³² For both the ADSs and London shares, the industry index is comprised of HSBC Holdings plc, Lloyds Banking Group plc and Royal Bank of Scotland Group plc.

¹³³ Residual industry index returns are the portions of daily returns on the industry index which are not explained by market effects, as determined from a regression of industry index returns on market index returns during the Control Period. The use of residual industry index returns rather than raw returns eliminates any statistical problems due to multicollinearity. (*See* Greene, William H., *Econometric Analysis*, Prentice Hall, 2012, 7th Ed., Ch. 4, p. 89.)

¹³⁴ Exhibits 12A and 12C also provides a *t*-statistic for each day of the Class Period, which measures the statistical significance of Barclays' residual returns. Each daily *t*-statistic is equal to: (actual return – expected return) / standard error. The standard error of the regression equation measures the volatility of Barclays' actual stock returns relative to its expected returns. The larger the standard error, the greater the residual return must be (in absolute magnitude) in order to be considered statistically significant. If the *t*-statistic is greater than or equal to 1.97 or less than or equal to -1.97, the difference between the two returns is significantly different from zero at the 5% level of significance.